

CLAIMS:

1. An image reading method for producing image data by irradiating an image carrier including two-dimensionally distributed spots of a labeling substance with a stimulating ray to excite the labeling substance and photoelectrically detecting light released from the labeling substance, the image reading method further comprising a stimulation and detection step of irradiating the image carrier with a line beam of the stimulating ray to excite the labeling substance and photoelectrically detecting light released from the labeling substance after the completion of irradiation with the stimulating ray.
2. An image reading method in accordance with Claim 1 wherein the image carrier is intermittently moved relative to the line beam of the stimulating ray in a direction perpendicular to a longitudinal direction of the line beam and the stimulation and detection step is performed each time the image carrier is moved, thereby scanning the whole surface of the image carrier with the line beam of the stimulating ray and image data are produced by photoelectrically detecting light released from the labeling substance contained in the spots two-dimensionally distributed in the image carrier.
3. An image reading method in accordance with Claim 1, wherein the stimulation and detection step is repeated two or more times.
4. An image reading method in accordance with Claim 1, wherein the line beam of the stimulating ray is emitted from a laser diode array or a laser diode array constituted by one or more laser diodes.
5. An image reading method in accordance with Claim 1, wherein the laser beam emitted from a laser stimulating ray source is shaped using a lens to produce the line beam of the stimulating ray.
6. An image reading method in accordance with Claim 1, wherein the line beam of the stimulating ray is emitted from an LED array constituted by one or more LEDs.

7. An image reading method in accordance with Claim 1, wherein the stimulating ray emitted from an LED stimulating ray source is shaped using a lens to produce the line beam of the stimulating ray.

8. An image reading method in accordance with Claim 1, wherein the
stimulating ray emitted from an LED stimulating ray source is shaped by a slit
to produce the line beam of the stimulating ray.

9. An image reading method in accordance with Claim 1, wherein light released from the labeling substance is photoelectrically detected using a solid state imaging device.

10 10. An image reading method in accordance with Claim 9, wherein light released from the labeling substance is photoelectrically detected using a CCD line sensor.

11. An image reading method in accordance with Claim 10, wherein light
released from the labeling substance is photoelectrically detected using a cooled
15 CCD line sensor.

12. An image reading method in accordance with Claim 9, wherein light released from the labeling substance is photoelectrically detected using a photodiode array.

13. An image reading method in accordance with Claim 12, wherein light
20 released from the labeling substance is photoelectrically detected using a cooled
photodiode array.

14. An image reading method in accordance with Claim 9, wherein light released from the labeling substance is photoelectrically detected using a MOS type imaging device.

25 15. An image reading method in accordance with Claim 14, wherein light released from the labeling substance is photoelectrically detected using a cooled MOS type imaging device.

16. An image reading method in accordance with Claim 1, wherein the

labeling substance is formed of a fluorescent substance.

17. An image reading method in accordance with Claim 16, wherein the image carrier is constituted as a membrane filter including the fluorescent substance contained in two-dimensionally distributed spots.

5 18. An image reading method in accordance with Claim 16, wherein the image carrier is constituted as a gel support including the fluorescent substance contained in two-dimensionally distributed spots.

10 19. An image reading method in accordance with Claim 16, wherein the image carrier is constituted as a micro-array including the fluorescent substance contained in two-dimensionally distributed spots.

20. An image reading method in accordance with Claim 1, wherein the image carrier is constituted as a stimuable phosphor sheet formed with a stimuable phosphor layer including a radioactive labeling substance contained in two-dimensionally distributed spots.

15 21. An image reading apparatus adapted for irradiating an image carrier including a labeling substance contained in two-dimensionally distributed spots with a stimulating ray and photoelectrically detecting light released from the labeling substance, thereby producing image data, the image reading apparatus comprising at least one stimulating ray source for emitting a stimulating ray, a
20 stimulating ray shaping means for shaping the stimulating ray emitted from the at least one stimulating ray source into a line beam, a sensor for photoelectrically detecting light released from the labeling substance, and a control means for performing a stimulation and detection step of irradiating the
25 image carrier including the labeling substance contained in the two-dimensionally distributed spots with the line beam of the stimulating ray to stimulate the labeling substance, stopping irradiation with the line beam of the stimulating ray and causing the sensor to photoelectrically detect light released from the labeling substance after the completion of irradiation with the line

beam of the stimulating ray.

22. An image reading apparatus in accordance with Claim 21, which further comprises a scanning means for intermittently moving the image carrier relative to the line beam of the stimulating ray in a direction perpendicular to a longitudinal direction of the line beam and wherein the control means is constituted so as to perform the stimulation and detection step each time the image carrier is intermittently moved by the scanning means, thereby scanning a whole surface of the image carrier with the line beam of the stimulating ray and the sensor is constituted so as to photoelectrically detect light released from the labeling substance contained in the spots two-dimensionally distributed in the image carrier to produce image data.

23. An image reading apparatus in accordance with Claim 21, wherein the control means is constituted so as to repeat the stimulation and detection step two or more times.

24. An image reading apparatus in accordance with Claim 21, wherein the at least one stimulating ray source and the stimulating ray shaping means are constituted as a laser diode array or a laser diode array provided with two or more laser diodes.

25. An image reading apparatus in accordance with Claim 21, wherein the at least one stimulating ray source is constituted as a laser stimulating ray source and the stimulating ray shaping means is constituted as a lens.

26. An image reading apparatus in accordance with Claim 21, wherein the at least one stimulating ray source and the stimulating ray shaping means are constituted as an LED array provided with one or more LEDs.

27. An image reading apparatus in accordance with Claim 21, wherein the at least one stimulating ray source is constituted as an LED stimulating ray source and the stimulating ray shaping means is constituted as a lens.

28. An image reading apparatus in accordance with Claim 21, wherein the

stimulating ray shaping means is constituted as a slit.

29. An image reading apparatus in accordance with Claim 21 wherein the sensor is constituted as a solid state imaging device.

30. An image reading apparatus in accordance with Claim 29, wherein the
5 sensor is constituted as a CCD line sensor.

31. An image reading apparatus in accordance with Claim 29, wherein the sensor is constituted as a cooled CCD line sensor.

32. An image reading apparatus in accordance with Claim 29, wherein the sensor is constituted as a photodiode array.

33. An image reading apparatus in accordance with Claim 32, wherein the
10 sensor is constituted as a cooled photodiode array.

34. An image reading apparatus in accordance with Claim 29, wherein the sensor is constituted as a MOS type imaging device.

35. An image reading apparatus in accordance with Claim 29, wherein the
15 sensor is constituted as a cooled MOS type imaging device.

36. An image reading apparatus in accordance with Claim 21, which further comprises a stimulating ray cut filter disposed in a path of light released from the labeling substance for cutting at least a light component having a wavelength of the stimulating ray.

37. An image reading apparatus in accordance with Claim 21, wherein the
20 labeling substance is formed of a fluorescent substance.

38. An image reading apparatus in accordance with Claim 37, wherein the image carrier is constituted as a membrane filter including the fluorescent substance contained in two-dimensionally distributed spots.

39. An image reading apparatus in accordance with Claim 37, wherein the
25 image carrier is constituted as a gel support including the fluorescent substance contained in two-dimensionally distributed spots.

40. An image reading apparatus in accordance with Claim 37, wherein the

image carrier is constituted as a micro-array including the fluorescent substance contained in two-dimensionally distributed spots.

41. An image reading apparatus in accordance with Claim 21, wherein the image carrier is constituted as a stimuable phosphor sheet formed with a stimuable phosphor layer including a radioactive labeling substance contained
- 5 in two-dimensionally distributed spots.